

Physical Observations of Jupiter. By Sir W. Keith Murray.

"I annex a sketch of *Jupiter*, showing the position and appearance of remarkable streaks visible below the southern principal belt since the 27th October last. They were first observed by me at 16^h 30^m G.M.T., on Wednesday 27th October; I have seen them several times since, but not well, till last night, at 9^h 48^m G.M.T., when they appeared to occupy the same relative position and proportions as when first observed. I have observed another detached spot, and also indications of several white spots, all on the southern hemisphere, but the atmosphere has generally been too unfavourable for delicate observation. The instrument used is an 8½-feet Munich telescope.*

"*Ochertyre, Crieff, Nov. 13, 1858.*"

Physical Observations of Jupiter. By W. Lassell, Esq.

"As a favourable state of atmosphere for the use of the 20-foot equatoreal is in this locality almost as rare as the visit of a comet, I cannot deny myself the pleasure of sending you a drawing of the planet *Jupiter*, as seen last night with this instrument—or rather early this morning.

"I had previously been in the smaller dome, showing the planet with the 9-foot telescope to some visitors, and after their departure to some members of my family, the atmosphere being unusually fine; and, moreover, on turning to γ^2 *Andromedæ*, and finding that the picture was very fine, the third star being well and cleanly separated from the second, with a power of 752, so as to show the sky fairly between them; I opened the larger dome and began a series of measures of the equatoreal diameter of *Jupiter*, with Airy's double-image micrometer.

"When they were nearly completed I was struck with the unprecedented sharpness of the images; and even while they were separated and in process of passing over each other, some details caught my attention which I had not observed with the 9-foot, and induced me forthwith to prepare to observe the planet more attentively and with higher powers. The enclosed drawing I have made as carefully as in my power, from sketches made during observation in my journal, and it represents gene-

* It is interesting to find that the two streaks here referred to by the author exhibit on the accompanying diagram precisely the same relative magnitude, and the same position on the disk (subject to a slight difference in longitude, caused by the rotation of the planet), as similar streaks observed by Mr. Lassell (see next paper).—ED.

rally the aspect of *Jupiter* at about 13^h 45^m G.M.T. I say generally, because to give every minute spot and shading in its true form, position, and intensity, is far beyond my powers. There is, however, I believe no point of detail here marked down, which had not its counterpart in the original, to which it bears at least a strong resemblance. One of the most novel features I noticed was the existence of a numerous group of white spots in the bright equatorial region, far more delicate and difficult to see than those in the southern hemisphere, which I first noticed on the 27th March, 1850, and of which there is a sketch in the *Monthly Notices*, Vol. X., page 134. For several years I failed to see any such spots upon the face of *Jupiter* at all, but last year they appeared again in the same quarter of the planet, and were attentively and ably observed by Mr. Dawes, who has furnished the Society with a series of elaborate and very beautiful drawings of them. As they are always very delicate phenomena, it may be possible that the southern declination of *Jupiter*, during a great part of the interval, may account for their not having been observed.

“But the appearance of similar spots in the very brilliant central portion of the planet is to me new. They could only be seen in the most tranquil moments of the atmosphere, while the formerly noticed spots in the southern region remained constantly and steadily visible.

“The two remarkable oblong spots have existed some time on the planet, but I have never seen them so distinctly before: in point of intensity they are not at all exaggerated in the drawing. The dark belts of *Jupiter* this year are far narrower, more numerous and far lighter in tint than usual—this accounts perhaps for the great contrast, and suggests the idea that these spots (which have also others in their train) may be an incipient dark belt, such as has formerly occupied this region of the disk.

“This observation has been very interesting to me in another point of view, as establishing the correctness of the opinion I have held for some time, that the last surfaces given to the mirrors of the 20-foot telescope are as perfect both in point of curve and regularity as those of the 9-foot telescope, and only require an atmosphere *proportionately fine* to establish their proportionate efficiency. No impression was received of the existence of the equatorial spots with the 9-foot, though defining admirably with 270, while with 565 on the 20-foot they were seen nearly as plainly at the moments of best vision, as the southern spots were seen with the former instrument. The chief difference in the quality of vision was that in the smaller equatorial, it was almost continuously good, while in the larger equatorial the fits of finest vision had to be waited for.

“*Bradstones, Sandfield Park, near Liverpool,*
Nov. 19, 1858.”

"Referring to my former communication of the 19th Nov., I send another drawing of the planet *Jupiter* as seen on the 5th Dec., at 12^h 45^m with a power of 430 on the 20-foot equatoreal. On comparing this diagram with the former one, it will be seen that the two conspicuous dark spots, or lines, are nearly similarly situated in both, but the largest and plainest bright spot is now evidently in a different position with respect to the dark ones, as if it had gained somewhat in rotation upon them. I observed both the bright and dark spots on the 21st Nov., but they then appeared to me to have the same relative positions as on the 18th. The dark spots have not sensibly changed their relative position either to each other or to any specific locality on the face of the planet since I first noticed them 7 or 8 weeks ago; *i.e.*, if their regular return to conjunction in accordance with the known period of the planet's rotation may be taken as a test. The night of the 5th inst. was not nearly so favourable as that of the 18th ult., and not so many spots in the southern belt could be seen, nor more than indications of bright spots in the bright equatoreal band; yet the two bright spots here delineated were so exactly similar in appearance and in relative position, that I think there is ground for presuming that they are the same as the largest and brightest two seen on the 18th ult., which must lead to the inference of a rate of motion different from that of the dark spots. Further observations, if the sky permit, may possibly settle the question.

"The outline of this diagram is rather carefully drawn from a series of measures made with the double-image micrometer with a view to determine the exact form of the planet, whether truly elliptical or not. The measures were made on the 5th inst., and were as follows—the numbers being simply the readings of the micrometer—magnifying power 467:—

Equatoreal diameter	. 11'115
At 30° latitude diameter	. 10'955
„ 60° „ „	. 10'627
Polar diameter	. 10'494

A comparison of these measures of the polar and equatoreal diameters gives the equatoreal to the polar as 1:0'9441; a former series with power 310 on the 21st Nov., gave the proportion as 1:0'9422, another with power 467 on the same evening gave 1:9458, mean of the whole 1:0'9440, or the polar diameter less than the equatoreal by $\frac{1}{17'857}$ th part of the latter. The result shows a less ellipticity than I had expected, but the measures were carefully taken, and the circumstances pretty favourable.

"*Liverpool, 16th December, 1858.*"